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Open Educational Resources for the state of Texas

C. Sidney Burrus

The Connexions Project

Rice University, Houston, Texas USA

September 2010

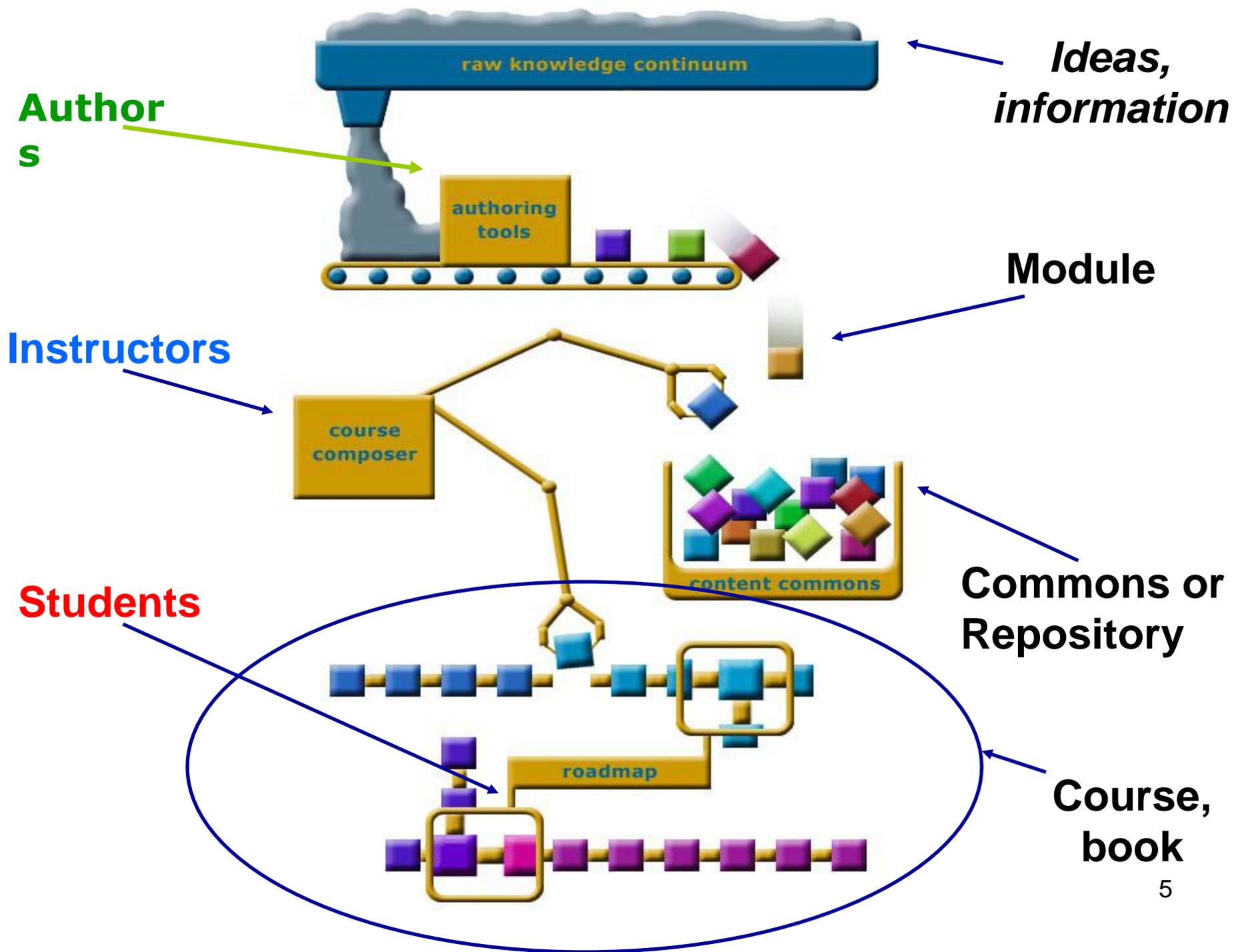
Open Educational Resources

The **Open Educational Resource** (OER) movement was inspired by the **Open Source** movement in software. Information is freely usable, re-usable, mixable, modifiable, etc.

- Open Course Ware “**OCW**” (MIT)
- Connexions “**Cnx**” (Rice)
- Wikipedia (**Wikibooks**, etc.)
- Siyavula project (Shuttleworth Foundation)
- CK-12, Curriki, PLoS, PubMed, EOL, etc.

What is Connexions?

1. A **repository** of modules of information available through the **web** on the Internet
 - **Modules** (and **collections**) encoded in **XML**, one concept, a few pages, a quantum of information
2. A set of **tools** for authoring, maintaining and using the content of the repository
 - Module **editor**, importer, course or book **composer**, repository organizer, **Creative Commons** license, tools for printing **books**
3. A **community** of **people** who share educational interests and information
 - Interest groups (authors, instructors, students),



Modular Structure of Connexions

- The **module** contains a stand-alone concept. It is a quantum of knowledge.
- The module should make sense if found by a search engine such as Google or Bing.
- A **collection** or **book** is a coherent collection of modules.
- Analogy with a **CD** as being a collection of songs, or a play-list for a band or MP3 player, or a concert program, or an anthology
- Analogy with the **degree requirements** for a major at a university

Books and On-Line Use with XML

Books from Connexions:

- Personalized, on-demand printing, up-to-date, inexpensive, collaboratively authored, allows pre and post publication review, never “out of print”, “Long tail” publications, content for eBooks, one button to buy printed book

On-Line use of Connexions:

- Allows modern pedagogy: concept-based, problem solving-based, discovery-based learning. Dynamic, interactive, linked, adapts to learning style, student and author driven, allows “assessment and evaluation”, Virtual Labs

Possible Ways to Use

- Bound and **printed paper books** that look like traditional books but are low cost and always up-to-date. This is **phase one**.
- Down Loadable **pfd files** which are free and can be used on a eBook reader or printed locally. This is also **phase one**.
- Free, interactive, dynamic **on-line use** on a screen such as a computer or hand-held device (iPhone). This is **phase two!**
- **New methods** that we cannot imagine now. This is the definition of **phase two**.

Create, Author

RELATED MATERIAL

Similar content

- [Complex Fourier Series and Their Properties](#)
- [Fourier Series: Eigenfunction Approach](#)
- [Orthonormal Basis Expansions](#)

MORE »

Courses using this content

- [Signals and Systems](#)

Fourier Analysis in Complex Spaces

[Print \(PDF\)](#)

By: [MICHAEL HAAG](#), [JUSTIN ROMBERG](#)

Summary: This module derives the Discrete-Time Fourier Series (DTFS), which is a fourier series type expansion for discrete-time, periodic functions. The module also takes some time to review complex sinusoids which will be used as our basis.

Introduction

By now you should be familiar with the derivation of the [FOURIER SERIES](#) for continuous-time, periodic functions. This derivation leads us to the following equations that you should be quite familiar with:

$$f(t) = \sum_n (c_n e^{j\omega_0 n t})$$
$$c_n = \frac{1}{T} \int f(t) e^{-j\omega_0 n t} dt$$
$$= \frac{1}{T} \langle f, e^{j\omega_0 n t} \rangle$$

frequency $\omega_0 n$ in $f(t)$.

In this module, we will derive a similar expansion for discrete-time, periodic functions. In doing so, we will derive the **Discrete Time Fourier Series** (DTFS), or the [DISCRETE FOURIER TRANSFORM](#) (DFT).



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Author of Music Content

Catherine Schmidt-Jones

well over **600,000** page views
per month

many by
US K-12
teachers



A screenshot of a Mozilla Firefox browser window. The address bar shows the URL 'http://cnx.rice.edu/content/col10208/latest/'. The page header features the 'connexions' logo with the tagline 'sharing knowledge and building communities'. The main heading is 'Introduction to Music Theory' by Catherine Schmidt-Jones.

Start Course

Instructor: Catherine Schmidt-Jones
Course Author: Catherine Schmidt-Jones

Course Description: This course introduces the basic concepts and terms needed to discuss melody and harmony. It is intended for teens or adults with no background in music theory but some familiarity with reading common notation and playing an instrument (or singing). Concepts covered include interval, major and minor keys and scales, triads and chords.

Contributing Authors: Catherine Schmidt-Jones, Russell Jones



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This work is licensed by Catherine Schmidt-Jones under a [Creative Commons License](#).

Pitch and Interval

- [Octaves and the Major-Minor Tonal System](#)
- [Half Steps and Whole Steps](#)
- [Interval](#)
- [Ear Training](#)

Keys and Scales

- [Major Keys and Scales](#)
- [Minor Keys and Scales](#)
- [The Circle of Fifths](#)

Triads and Chords

- [Triads](#)
- [Naming Triads](#)
- [Beginning Harmonic Analysis](#)
- [Cadence in Music](#)
- [Consonance and Dissonance](#)
- [Beyond Triads: Naming Other Chords](#)

Fundamentals of Signal Processing



By: [Minh Do](#)

Start Course

Course Author: [Minh Do](#)

Course Description: Presents fundamental concepts and tools in signal processing including: linear and shift-invariant systems, vector spaces and signal expansions, Fourier transforms, sampling, spectral and time-frequency analyses, digital filtering, z-transform, random signals and processes, Wiener and adaptive filters.

Contributing Authors: [Anders Gjendemsjø](#), [Benjamin Fite](#), [Clayton Scott](#), [Don Johnson](#), [Douglas L. Jones](#), [Hyeokho Choi](#), [Ivan Selesnick](#), [Justin Romberg](#), [Melissa Selik](#), [Michael Haag](#), [Minh Do](#), [Ricardo Radaelli-Sanchez](#), [Richard Baraniuk](#), [Rob Nowak](#)

Course Content

» Introduction to Fundamentals of Signal Processing

FOUNDATIONS

- » Signals Represent Information
- » Introduction to Systems
- » Discrete-Time Signals and Systems
- » Linear Time-Invariant Systems



Fundamentals of Signal Processing

Minh Do

Connexions in Spanish

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Análisis de Fourier en Espacios Complejos

[Print \(PDF\)](#)

By: [MICHAEL HAAG](#), [JUSTIN ROMBERG](#), [ERIKA JACKSON](#), [FARA MEZA](#)

Based on: [FOURIER ANALYSIS IN COMPLEX SPACES](#) by [MICHAEL HAAG](#), [JUSTIN ROMBERG](#)

Summary: Este modulo deriva la series de Fourier discreto en el tiempo (DTFS), la cual es un tipo de expansión de fourier para funciones periodicas y discretas en el tiempo. El modulo tambien da un repaso a los senosoidales complejos que sirven como bases.



estar familiarizado con la derivación de la [SERIES DE FOURIER](#) par alas Esta derivación nos lleva a las siguientes ecuaciones las cuales usted

$$f(t) = \sum_n (c_n e^{j \omega_0 n t}) \quad (1)$$

$$c_n = \frac{1}{T} \int f(t) e^{-j \omega_0 n t} dt$$
$$= \frac{1}{T} \langle f, e^{j \omega_0 n t} \rangle \quad (2)$$

DSPanish



donde c_n nos dice la cantidad de frecuencia en $\omega_0 n$ in $f(t)$.

RELATED MATERIAL

Similar content

- [Fundamentals of Digital Signal Processing Lab](#)
- [Introduction to Digital Signal Processing](#)
- [Control Systems Laboratory](#)

MORE >>

Courses using this content

- [DSP](#)

Preface for U of I DSP Laboratory (Thai Version)

Print (PDF)

By: [DOUGLAS L. JONES](#), [PATRICK FRANTZ](#), [KAMOLCHANOK KRIENGCHAIPRUCK](#)
 Based on: [PREFACE FOR U OF I DSP LABORATORY](#) by [DOUGLAS L. JONES](#)

Summary: The DSP Laboratory textbook is well suited for a variety of course organizations, and Connexions provides the ideal venue for the textbook.

เอกสารฉบับนี้สร้าง
 (Digital Signal Pro
 กว่าปีของการร่วมมือ
 เนื้อหาของเอกสาร
 การปฏิบัติการประ
 ซึ่งเป็นวิชาเลือก ส
 Urbana-Champai
 และเป็นส่วนที่แสดง

RELATED MATERIAL

Similar content

- [DSP Development Environment: Introductory Exercise for TI TMS320C54x](#)
- [DSP Development](#)

Preface for U of I DSP Laboratory (Japanese Version)

Print (PDF)

By: [PATRICK FRANTZ](#), [EMIKO YAMAI](#)
 Based on: [PREFACE FOR U OF I DSP LABORATORY](#) by [DOUGLAS L. JONES](#)

Summary: The DSP Laboratory textbook is well suited for a variety of course organizations, and Connexions provides the ideal venue for the textbook.

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- [Development Environment: Introductory Exercise for TI TMS320C54x](#)
- [Development Environment: Introductory Exercise for TI TMS320C54x](#)

Preface for U of I DSP Laboratory (Chinese Version)

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By: [PATRICK FRANTZ](#), [KANGLIN WANG](#)
 Based on: [PREFACE FOR U OF I DSP LABORATORY](#) by [DOUGLAS L. JONES](#)

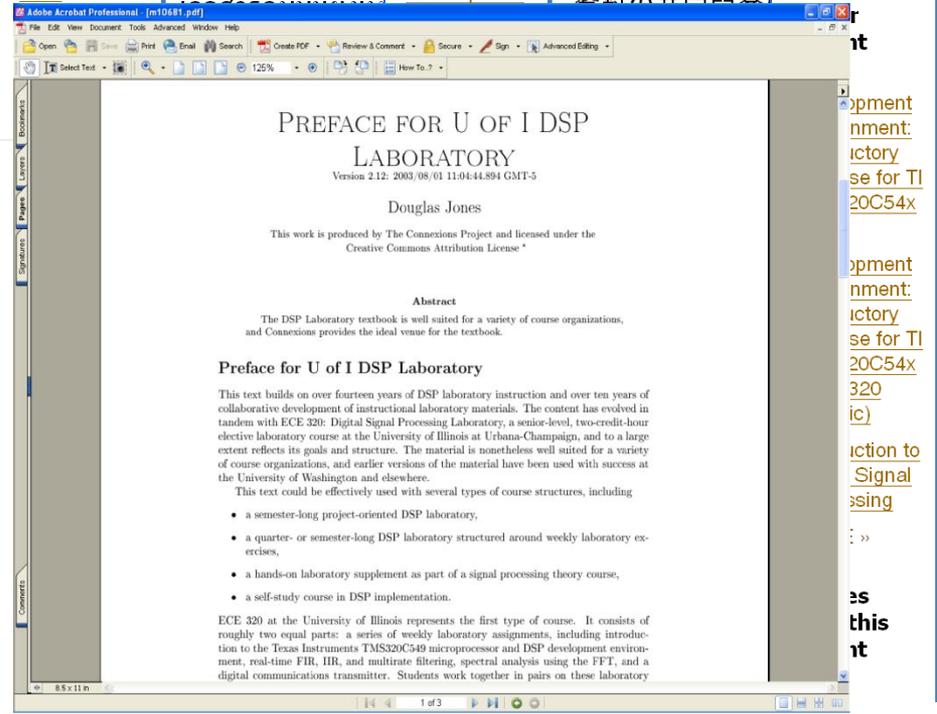
Summary: The DSP Laboratory textbook is well suited for a variety of course organizations, and Connexions provides the ideal venue for the textbook.

摘要：该DSP(数字信号处理)教程适合多种相关课程使用，而Connexions则为该教程提供了一个理想的演示平台。

该教程是建立在使用了14年以上的实验指导和历时10年经合作开发的实验讲义基础上的。内容主要来自ELEC320----伊利诺伊大学厄本那 - 香槟分校(the University of Illinois Urbana-Champaign)一门本科四年级两学分的实验选修课。本教程编排结构和教学目的都与其大致相同。本教程适合多种相关课程使用，其早期版本被华盛顿大学(the University of Washington)等成功地用于教学。

该教程可用于多种不同的教学安排，包括：

- 一学期制的以课程设计为主(project-oriented)的DSP实验课，
- 半学期制或一学期制的并在每周有实验安排的DSP实验课，



Interactive, Dynamic Virtual Lab

RELATED MATERIAL

Inverted Pendulum on a Translating Base

[Print \(PDF\)](#)

By: [ROBERT BISHOP](#)

Prerequisite links

-  [LabVIEW Simulation Tutorial](#)
-  [LabVIEW Control Design Tutorial \(TechTeach\)](#)

Similar content

- [Control Systems Laboratory](#)
- [Fundamentals of Digital Signal Processing Lab](#)
- [What is Priority Control ?](#)

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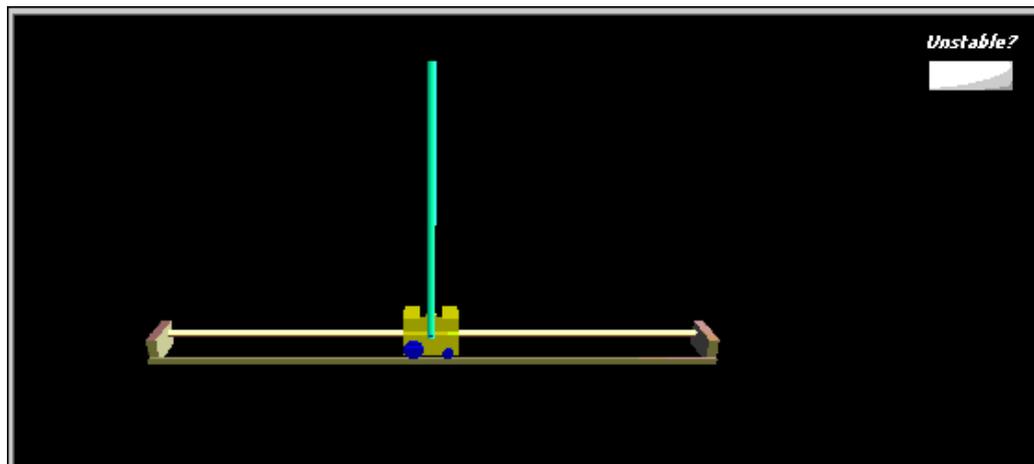
- [Control Systems Laboratory](#)

PERSONALIZE

Choose a style

- [Summer Sky](#)

Summary: The objective of this lab is to understand the dynamics of an inverted pendulum with a translating base. Students will use feedback to control an unstable system. The controller will be designed and implemented in LabVIEW using the Simulation Module and Control Design Toolkit.



Controller | Plant Model

Setpoint Gain
-70.7107

Set Point (Meters)
-0.3 -0.2 0 0.2 0.3
0

K
-70.7107
-37.8345
105.53
20.9238

Initial Conditions

X	X-dot	theta	theta-dot
0	0	0	0

Outputs

Distance (cm)

Simulation Time

X

Theta

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LabVIEWTM

Multimedia

RELATED MATERIAL

FIR Filter Example

By: [DON JOHNSON](#)

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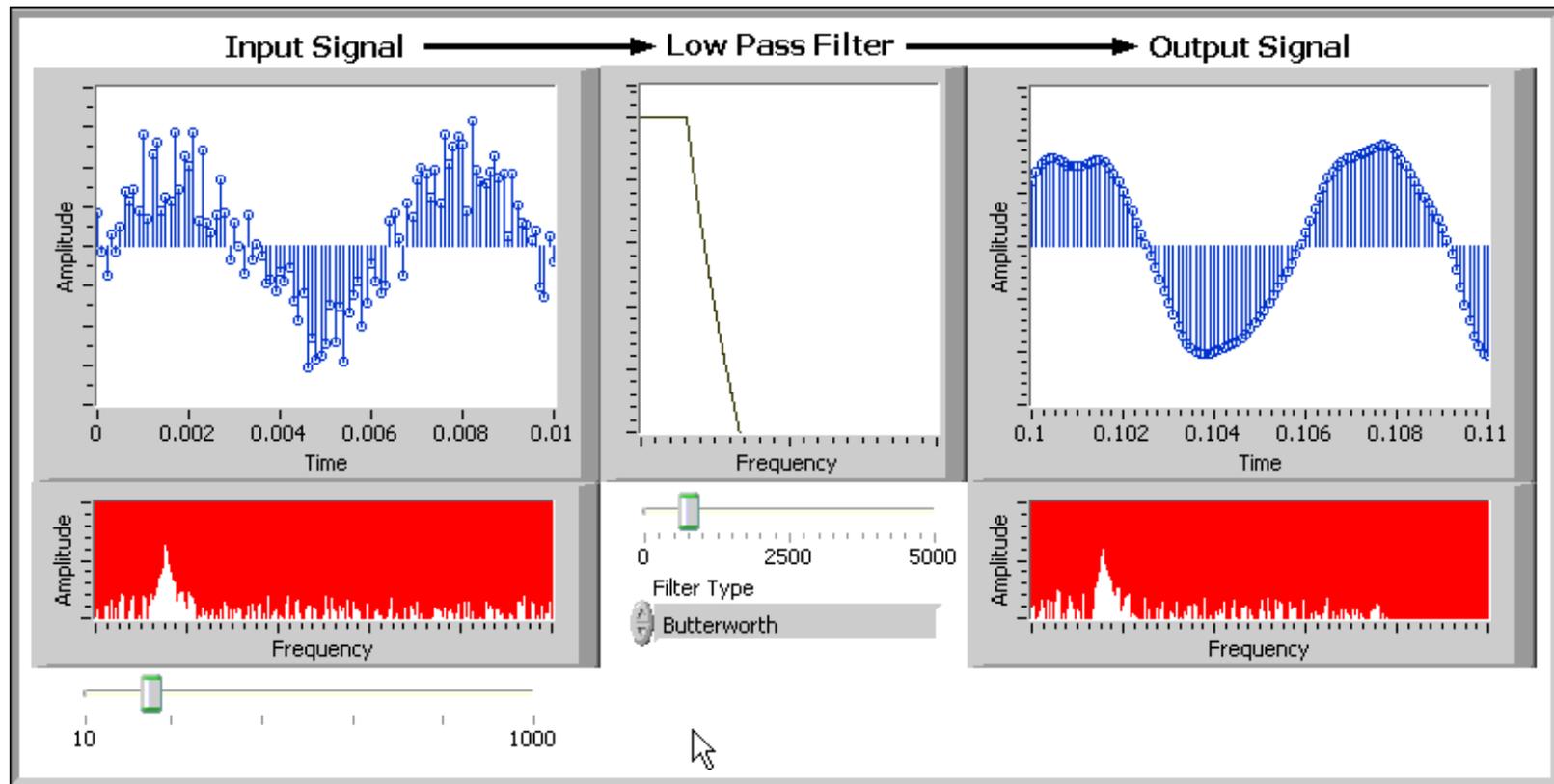
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EDIT-IN-PLACE

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Summary: An example of using a Finite Impulse Response filter.



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- ▶ 6. The Normal Distribution
- ▶ 7. The Central Limit Theorem
- ▶ 8. Confidence Intervals
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- ▶ 10. Hypothesis Testing: Two Means, Paired Data, Two Proportions
- ▶ 11. The Chi-Square Distribution
- ▶ 12. Linear Regression and Correlation
- ▶ 13. F Distribution and ANOVA
- ▶ 14. Appendix
- 15. Tables

Collaborative Statistics

Collection type: Textbook
Textbook by: [Dr. Barbara Illowsky](#), [Susan Dean](#)

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Summary: Collaborative Statistics was written by Barbara Illowsky and Susan Dean, faculty members at De Anza College in Cupertino, California. The textbook was developed over several years and has been used in regular and honors level classroom settings and in distance learning classes. This textbook is intended for introductory statistics courses being taken by students at two- and four-year colleges who are majoring in fields other than math or engineering. Intermediate algebra is the only prerequisite. The book focuses on applications of statistical knowledge rather than the theory behind it.

This collection contains:

Modules by: [Dr. Barbara Illowsky](#), [Susan Dean](#)

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Collaborative Statistics

Textbook by Dr. Barbara Illowsky and Susan Dean

Introductory statistics is a two- and four-year course being taken by students other than math or engineering. The major prerequisite for this course is algebra. This book focuses on the application of statistical knowledge rather than the theory behind it.

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3. Probability Topics

4. Discrete Random Variables

5. Continuous Random Variables

6. The Normal Distribution

7. The Central Limit Theorem

8. Confidence Intervals

9. Hypothesis Testing: Single Mean and Single Proportion

10. Hypothesis Testing: Two Means, Paired Data, Two Proportions

11. The Chi-Square Distribution

12. Linear Regression and Correlation

13. F Distribution and ANOVA

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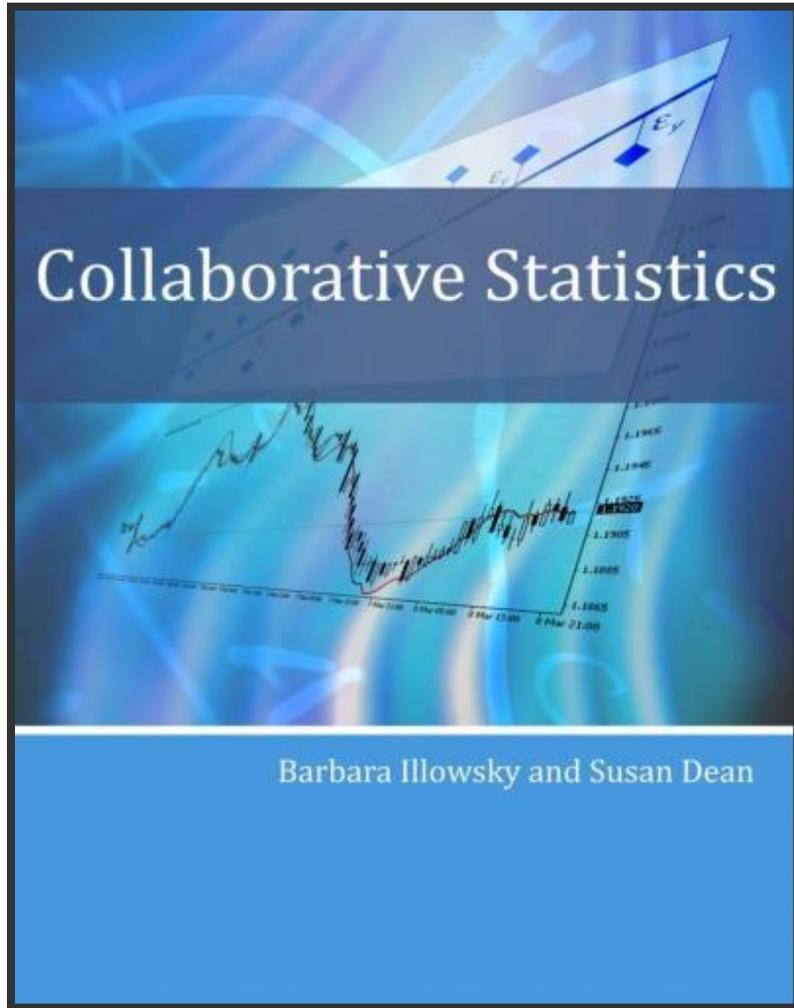
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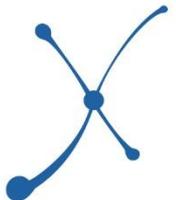
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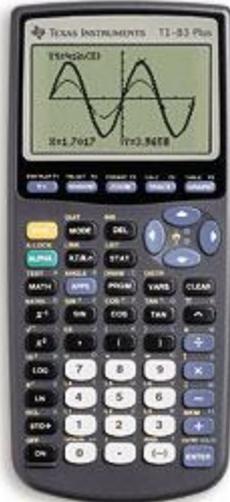


Collaborative Statistics

Barbara Illowsky & Susan Dean



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Collaborative Statistics - Teegarden

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Probability Topics: Probability

Labs For Collaborative Statistics - Teegarden

Collection by: [Mary Teegarden](#)

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Summary: This is a collection of labs from Collaborative Statistics by Illowski and Dean which have been edited to include Minitab activities. In addition the labs are to be done as individual activities.

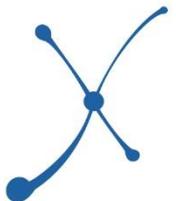
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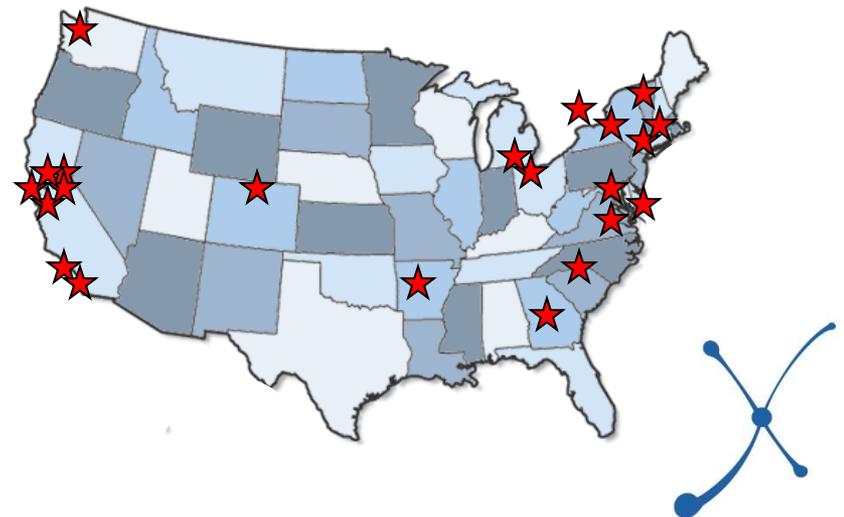
- Estimated cost savings to students \sim \$200,000 in the first year
- Roughly 50% of students bought a hard copy of textbook



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ecosystem – *primordial state*

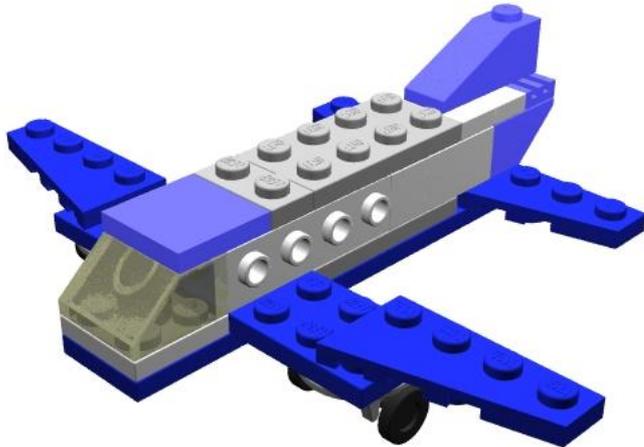
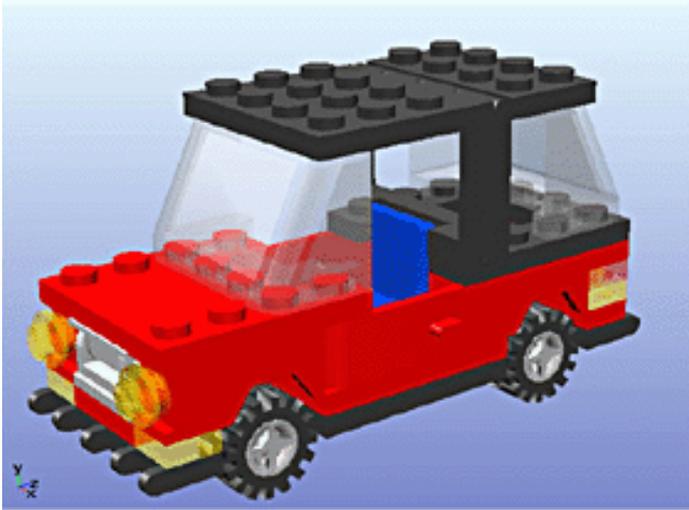




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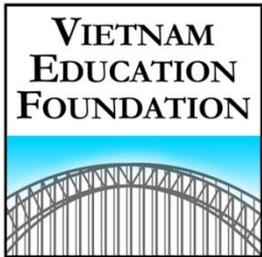
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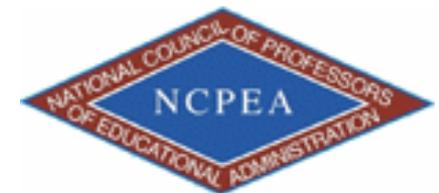


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Current State

Usage

Repository: 17,081 modules, 18,000 revisions, 1015 courses or books, over 8000 author accounts, 147 countries, 200 print-on-demand books

In Sept. 2006: 17M hits, 1.2M pages views, 520K unique users from 157 countries

Globalization

Europe: Germany, Norway, Macedonia, France, etc.

Asia: China, India, Pakistan, Japan, Vietnam, etc

LACCEI: “Connexions in the Americas” project

Growth of Numbers of Modules

